©SLJBR Volume 16. Volume 3. May 2026 ISSN (Print), ISSN (Online First)

Rabies in Sierra Leone: A Review of the Epidemiology, Public Health Burden, Control, and Challenges

[1,2]Edwin Idriss Mustapha, [3]Ahmed Foray Samba, [4]Saidu Kanu, [5]Alhaji U. N'jai, [6]Jacqueline Kasiiti Lichoti

[1]Teko Livestock Research Centre, Sierra Leone Agricultural Research Institute; [2]Africa Centre of Excellence in Agricultural Development and Sustainable Environment, Federal University of Agriculture Abeokuta, Nigeria; [3]Central Veterinary Laboratory, Teko, Makeni; Livestock and Veterinary Services Division, Ministry of Agriculture and Food Security, Makeni, Sierra Leone; [4]Faculty of Agriculture, University of Makeni; [5]University of Sierra Leone, Freetown, Sierra Leone and Koinadugu College, Kabala, Sierra Leone; [6]Food and Agricultural Organization of The United Nations, Sierra Leone

***Corresponding author**: mustaphaedwin@yahoo.com

Abstract

Rabies is a preventable yet fatal zoonotic disease that remains endemic in Sierra Leone. Despite the availability of effective vaccines, dog-mediated rabies continues to pose a major public health threat, largely due to poor knowledge in domestic animal management, low canine vaccination coverage, weak surveillance systems, and limited access to post-exposure prophylaxis (PEP). This review synthesises available evidence on the epidemiology of rabies and its implications for public health and animal health in Sierra Leone, focusing on transmission dynamics, dog ecology, vaccination coverage, and laboratory surveillance. Historical and contemporary data indicate that the rabies virus circulates within the canine population, as reflected by high antigen detection rates in suspected dogs and the presence of rabies antibodies in apparently healthy, unvaccinated animals. Human rabies remains endemic, driven primarily by frequent rabid dog bites, delayed health-seeking behaviour, reliance on traditional wound management practices, and structural barriers to PEP access. Rabies surveillance is largely dog bite-based, with diagnostic capacity centralised at the national level, resulting in under-reporting and delayed confirmation of cases. Although One Health initiatives and periodic vaccination campaigns have been implemented, these efforts remain unsustainably fragmented and insufficient to interrupt transmission. Achieving the global target of zero dog-mediated human rabies deaths by 2030 will require robust and sustained

mass dog vaccination, decentralised diagnostics, improved access to PEP, strengthened surveillance, and integrated One Health strategies tailored to the Sierra Leonean context.

Keywords: *Rabies; Sierra Leone; Dog-mediated rabies; Zoonoses; Vaccination*

Introduction

Rabies is an acute, fatal viral encephalitis caused by the rabies virus (RABV), a negative, single-stranded RNA virus of the genus *Lyssavirus* within the family *Rhabdoviridae* (Franka and Wallace, 2018; Rattanavipapong *et al*., 2019). The virus infects all warm-blooded mammals and is transmitted primarily through the saliva of infected animals, most commonly through bites. Once clinical disease develops, rabies is almost universally fatal, making prevention through vaccination and timely post-exposure prophylaxis (PEP) essential for disease control.

Globally, rabies claims about 59,000 lives annually, with the majority death occurring in Africa and Asia (Fooks *et al*., 2014; Hampson *et al*., 2015; Kaye *et al*., 2024; Khairullah *et al*., 2023). In sub-Saharan Africa, where the disease is endemic, domestic dogs are responsible for over 99% of human fatalities, which reflects the dominance of the urban dog-mediated transmission cycle (Fooks *et al*., 2014). Despite rabies being entirely preventable, Sierra Leone remains among the countries where rabies is endemic. The rabies virus was first confirmed in Sierra Leone in 1949 at the Teko Laboratory in Makeni (Suluku *et al*., 2012), although cases involving cats and dogs were documented as early as 1932 (Gordon *et al*., 1933). The eleven year long civil war (1991–2002) had a great impact on rabies epidemiology by disrupting veterinary and public health services, increasing free-roaming dog populations that scavenge at garbage dumps in cities, and accelerating unplanned urbanisation (Suluku *et al*., 2012).

Despite being recognised as a priority zoonotic disease, rabies control in Sierra Leone is constrained by low canine vaccination coverage, limited access to affordable PEP, centralised diagnostic infrastructure, and inadequate surveillance systems (Kumoji *et al*., 2018; Suluku *et al*., 2022). A Joint Risk Assessment (JRA) by One Health (OH) partners conducted in selected districts to understand rabies exposure risks in the country identified areas like Moyamba and Kenema as higher risk for low vaccination or higher incidence of exposure/impact compared to Freetown (N'jai *et al*., 2024). Unlike in other parts of the world, like Latin America, where successful rabies elimination programmes have been implemented (Cleaveland and Hampson, 2017), rabies control efforts in Sierra Leone remain largely reactive and episodic (Suluku *et al*., 2022). This review, therefore, aims to synthesise current evidence on the epidemiology, public health burden, and control challenges of rabies in Sierra Leone, and to highlight

priority areas for intervention within a One Health framework.

Rabies awareness at the community level in Sierra Leone

A rabies survey at the community level to evaluate the awareness and knowledge of mainly community stakeholders is very important. This is key in Sierra Leone because over 95% of all positive rabies cases investigated at the Central Veterinary Laboratory (CVL), Teko, between 2019 and 2023 were associated with human exposure (Mustapha *et al*., 2023). In addition, knowledge, attitude, and practice (KAP) surveys are key to understanding community risk perception, as well as identifying cognitive, religious, behavioural, and cultural beliefs that may hinder infection control (Abubakar *et al*., 2024; Suluku *et al*., 2012; Tiwari *et al*., 2019). The review of the literature revealed that rabies awareness among the general public varies by study; for instance, an assessment in 2018 in the Bombali District found that 79% of participants had heard of rabies (Kumoji *et al*., 2018). A survey across the five regions by Mshelbwala *et al*., (2024) found 40.3% of the respondents were familiar with rabies disease. KAP studies are particularly important to identify gaps in the knowledge, attitude, or practices that could greatly impact the adoption of an intervention (Tiwari *et al*., 2019). For example, a study by Mshelbwala *et al*. (2024) reported that 24.5% of dog owners in urban areas are more likely to vaccinate their dogs compared to 11.6% those in rural areas.

Several socio-demographic factors, especially education, social status, and location (Urban versus rural), have been linked with a positive attitude towards dog rabies vaccinations, health-seeking behaviours of bite victims, and good first-aid practices after dog bite incidents in the country (Hatch *et al*., 2004; Kumoji *et al*., 2018; Mshelbwala *et al*., 2024; Suluku *et al*., 2022). Poor rabies awareness at the community level is a major setback for rabies control in Sierra Leone (Hatch *et al*., 2004). For example, as reported by Suluku *et al.* (2012), the non-compliance of most dog owners to vaccinate their dogs is due to their lack of knowledge about rabies (Suluku *et al*., 2012). According to a report from a study conducted by a community-based organisation, Breakthrough Action in Bombali, cases of dog bite victims are being treated using traditional herbs (Kumoji *et al*., 2018). Cultural beliefs greatly influence post-exposure care in Sierra Leone, as many dog bite victims prefer traditional treatments over contemporary medicine (Kumoji *et al*., 2018). Reported traditional practices

include applying salt, lime, or herbs to the wound, and even pulling hair from the offending dog's neck and placing it on the bite site (Kumoji *et al*., 2018). These traditional beliefs and practices are yet to be validated by standard procedures to justify their applications and success.

Dog ecology, population demographic surveys, and vaccination coverage

To implement an effective rabies control programme in a country, the first step is to conduct baseline epidemiological studies across the country (Abubakar *et al*., 2024). For a country like Sierra Leone, a national-level survey must be organized, ensuring uniformity in methodology that will include all 16 districts in the country. This will provide information on dog ecology, the estimated population of dogs within each stratum, the number of vaccines needed to achieve herd immunity, the dog vaccination rate, as well as the incidence of dog bites and associated demographics.

In Sierra Leone, dog ecology and population surveys conducted in selected regions have characterised the canine population as being influenced by post-war urbanisation, limited veterinary oversight, and dog management practices primarily driven toward security and hunting needs (Suluku, 2023; Suluku *et al*., 2012). In 2008, a study on post-war demographic and ecological survey of dog populations and their human relationships in Sierra Leone, done in the Freetown Urban Area, estimated a total dog population of 13,246, with a dog-to-human ratio of 1:14 in the Western Area (Suluku *et al*., 2012). The survey reported that 46% of households in Freetown own at least a dog. According to the review, the civil war, which lasted from 1991 to 2002, acted as a major demographic factor that caused a mass migration of humans and dogs from rural areas to major cities in search of safety (Suluku *et al*., 2012). This created high dog densities in urban centres, supported by expanding garbage dumps that provided easy scavenging opportunities for the dogs (Suluku *et al*., 2012). A cross-sectional study conducted in 2023 across the five regions in Sierra Leone, among 2,558 dog-owning households on factors influencing canine vaccination, recorded a total of 8,791 dogs with a dog-to-human ratio of 1:2.7, with an average of three dogs per household (Mshelbwala *et al*., 2024). The study reported dog-ownership by households in the provinces as follows: Southern region 46.1% (1,180/2,558) households, Eastern region 45.6% (1,167/2,558) households, Western Area 4.7% (119/2,558) households, and North-Western Province 3.6% (92/2,558) households (Mshelbwala *et al*., 2024). A

finding of a study by Suluku, (2023), the dog ownership pattern and the spread of rabies disease in Sierra Leone showed that 34.07% of households in Kenema district, 33.33% in Bombali district, and 32.59% in Moyamba district at least own dogs.

A questionnaire survey in Freetown between 2001 and 2002 found 0% vaccination coverage in dogs (Hatch *et al*., 2004). In 2008, the vaccination coverage in Freetown capital increased to 55%, largely due to free vaccination clinics provided by the Sierra Leone Animal Welfare Society (SLAWS) (Suluku *et al*., 2012). The canine vaccination coverage in Sierra Leone, however, remains critically low. A household survey conducted in 2023 across the five regions, involving 2,558 dog-owning families, reported 14% fully vaccinated coverage (Mshelbwala *et al*., 2024). An earlier study in 2015 estimated a 0.8% canine vaccination coverage in the country (Hampson *et al*., 2015). The current canine vaccination coverage falls significantly short of the 70% threshold recommended by the World Health Organization to interrupt the transmission of the rabies virus. The perceived barriers to canine vaccination in Sierra Leone, as reported by Mshelbwala *et al*. (2024), include informational gaps, as over 70% of dog owners in the country did not know how to access or obtain the vaccine. Those dog owners who know how to access or obtain the vaccine, but due to socio-economic constraints, the cost of the vaccine prevents them from vaccinating their dogs. Some dog owners have an attitude barrier. They did not believe rabies vaccination was important. Over 58% of dog owners, according to the review, reported having no livestock officer or veterinary establishment in their immediate vicinity (Mshelbwala *et al*. 2024). However, the efforts of the government to eradicate rabies remain largely erratic and reactive, often in response to outbreaks or to ceremonial events such as World Rabies Day (Suluku *et al*., 2022). Successfully eliminating dog-mediated human deaths by 2030 will require addressing these informational and geographic disparities through sustained, large-scale mass vaccination campaigns.

Prevalence of rabies antigen and antibodies in dogs

Recent laboratory data indicate that rabies is highly prevalent in the canine population in Sierra Leone, with high levels of both active viral antigens in suspected cases and antibodies in apparently healthy, unvaccinated dogs (Mustapha *et al*., 2023; Roland *et al*., 2022).

The prevalence of the rabies antigen is primarily monitored through the

surveillance of animal bites, which serves as a proxy for the disease in Sierra Leone. Between 2020 and 2022, more than 91.7% of dog heads submitted to the Central Veterinary Laboratory (CVL) Teko for diagnostic confirmation following bite incidents tested positive for rabies using the direct fluorescent antibody (DFA) test.

A random multistage study of 270 unvaccinated owned dogs across three districts in the country found that 25.2% tested positive for rabies antibodies (Roland *et al*., 2022). According to the review, Kenema District recorded the highest seropositivity at 39.71%, followed by Moyamba District, which recorded a seroprevalence of 38.23%, and Bombali District, which recorded the lowest of the three at 22.06%. In 2017, the brain of a suspected rabid cow from Koinadugu District was tested for rabies virus (RABV) using the real-time polymerase chain reaction technique at Njala University, and it was confirmed to be a dog-associated cattle rabies virus (Suluku *et al*., 2017). This documented the first case of dog-associated cattle rabies in Sierra Leone (Suluku *et al*., 2017).

Rabies occurrence in human

Human rabies is endemic in Sierra Leone. According to reports, the dog-to-human ratio is approximately 1:3 in the country (Mshelbwala *et al*., 2024). Such a large number of dogs in human settings, coupled with low vaccination imply the risk of rabies circulation and spread to human and other domestic animal populations (Mshelbwala *et al*., 2024). While official records are often hampered by under-reporting, it is estimated that approximately 301 human rabies deaths occur annually in the country (Mshelbwala *et al*., 2024). Historically, from 1968 to 1973, thirteen (13) rabies-related human deaths were recorded in Sierra Leone (Suluku *et al*., 2022). This prompted a national vaccination campaign in 1974, though the vaccination was short-lived due to competing government functions (Suluku *et al*., 2022).

Confirmed human rabies cases in the Western Area reached a notable peak in 2001. National records from 2018 to 2020 show a high frequency of animal bites and associated human fatalities (Suluku *et al*., 2022). One thousand, three hundred and fifty-four (1,354) dog bite cases were recorded in 2018, which resulted in 10 deaths. The number of dog bite cases increased to 1, 544 in 2019, resulting in 10 deaths. A total of 1,301 dog bite cases were recorded in 2020, resulting in six deaths (Suluku *et al*., 2022). Kenema recorded three confirmed rabies cases between 2019 and 2020 and a clinical case fatality in

2021. In 2016, 213 animal bites and four deaths were recorded in the Moyamba District. In December 2022, a confirmed rabid stray dog attacked children in a playing field, biting five of them, aged between 6 and 10 years; though the children sustained severe Category III wounds, they survived following medical intervention (Mustapha *et al*., 2023). In Moyamba District, a woman died days after being bitten by a rabid dog in 2017 due to a lack of post-exposure medical attention (Suluku, 2023).

Rabies occurrences in livestock and wildlife

In Sierra Leone, there is a documented evidence of rabies occurrence in livestock and circulation within various wildlife populations (Suluku *et al*., 2017; Williams *et al*., 2023). The first laboratory-confirmed case of dog-associated cattle rabies in Sierra Leone was reported in Koinadugu District in 2017, in an outbreak where a stray dog attacked a herd of 118 animals, resulting in a 7.6% mortality rate (nine deaths) (Suluku *et al*., 2017). Affected cattle exhibited clinical signs including anorexia, hyper-excitation, hydrophobia, foaming, and paralysis. Other livestock species are also vulnerable; for example, a rabid dog was reported to have killed six sheep in a single incident in the Musaia community, in Koinadugu District, northern Sierra Leone (Suluku *et al*., 2017). In 2022, CVL confirmed a case of dog-associated goat rabies submitted from Koinadugu District, northern Sierra Leone (2022 CVL Annual lab report up)

A sylvatic (wildlife) rabies cycle exists in Sierra Leone, with the virus circulating among reservoirs such as squirrels and other rodents (Williams *et al*., 2023). Community surveys indicate that residents identify monkeys and bats as potential wildlife carriers (Kumoji *et al*., 2018). Hunting practices significantly influence the risk of transmission from the wild to humans in the country. This could be attributed to hunters' unprotected methods of harvesting and processing wildlife carcasses.

Source of rabies infection and transmission

The primary source of rabies infection globally is the domestic dog (Broban *et al*., 2018). In sub-Saharan Africa, the dog is responsible for over 99% of human rabies fatalities (Khairullah *et al*., 2023). In countries such as Sierra Leone and Nigeria, the disease is primarily maintained through an urban cycle involving large populations of unvaccinated, free-roaming, and stray dogs (Abubakar *et al*., 2024; Mshelbwala *et al*., 2021). Rabies transmission occurs in

humans when the virus-laden saliva of a rabid animal is introduced through bites, scratches, or contact with infected saliva, mucous membranes, and broken skin (Khairullah *et al*., 2023; Whitbread *et al*., 2022). Though animal bites represent the most efficient route, licks from infected animals on existing skin breaches or abrasions also pose a significant transmission risk. The viral load, severity of the wound, and the proximity of the bite site to the brain (e.g., face, neck, or head) are some of the factors that determine the speed of viral progression to the central nervous system (Khairullah *et al*., 2023; N'jai *et al*., 2024).

A significant atypical source of transmission in West Africa arises from the handling, butchering, and consumption of infected carcasses, particularly within the dog meat trade found in regions of Nigeria and Cameroon (Adedeji *et al*., 2010; Mshelbwala *et al*., 2021). In Sierra Leone, spillover into livestock has been documented, such as cases where rabid dogs transmitted the virus to cattle, sheep, and goats, which can then lead to human exposure if these animals are handled or slaughtered for public consumption (Suluku *et al*., 2017).

A sylvatic cycle of rabies persists in wildlife reservoirs such as bats, foxes, jackals, mongooses, and rodents (like squirrels), where in, the virus can be introduced to domestic animal populations or directly to humans (Adedeji *et al*., 2010; Sabeta and Ngoepe, 2018; Whitbread *et al*., 2022). In Moyamba District, human wildlife interactions, including bat hunting and the consumption of fruits partially eaten by bats, have been identified as potential routes for pathogen spillover (Williams *et al*., 2023).

Rabies control challenges

Sierra Leone faces systemic challenges in disease surveillance, including gross under-reporting, a frail animal healthcare infrastructure, and a lack of reliable epidemiological data to guide national control efforts (Suluku *et al*., 2022). The country has limited government-employed veterinary officers and a handful of wildlife specialists capable of initiating sylvatic rabies vaccination programmes, which is significant as wildlife acts as a persistent reservoir (Suluku *et al*., 2012, 2022). Diagnostic capacity for animal diseases is centralised at the Teko Veterinary Laboratory in Makeni; this leads to logistical delays in specimen referral from remote provinces, often hindering prompt risk assessment for bite victims (Mustapha *et al*., 2023; N'jai *et al*., 2024; Roland *et al*., 2022). Elimination remains a challenge in Sierra Leone, as canine vaccination

coverage is currently 14% only, which is far lower than the 70% threshold recommended by the WHO to interrupt transmission (Mshelbwala *et al*., 2024).

Furthermore, the high cost of post-exposure prophylaxis (PEP), which can equal approximately US$20.50 per dose, results in defaulting in taking the full dosage and therefore not protecting the victim (Mustapha *et al*., 2023). Many communities located in remote areas with poor road networks make it difficult for health workers and veterinary officers to conduct outreach (Mshelbwala *et al*., 2024). The non-availability of reliable cold chain facilities at the community level can lead to the loss of vaccine potency during transport and storage (Mshelbwala *et al*., 2024).

Another challenge, as identified in the literature, is that the country does not currently have a national policy on dog ownership and management, and existing legislation is obsolete or poorly enforced (Suluku *et al*., 2018, 2022). Furthermore, the Animal Health Bill remains at the draft stage.

Traditional remedies and misattributions are among the challenges rabies control faces in the country. Victims, especially those living in remote, hard-to-reach communities, usually resort to "cheap" local remedies, such as applying salt, herbs, lime, or chili peppers to wounds. In some communities, rabies fatalities are attributed to witchcraft rather than a viral infection, leading families to seek spiritual help instead of immediate medical attention (Kumoji *et al*., 2018; Williams *et al*., 2023).

Conclusions

Though preventable, rabies remains a persistent public health and veterinary challenge in Sierra Leone, maintained primarily through large populations of unvaccinated, free-roaming dogs. Available evidence indicates rabies virus circulation within the canine population and continued spillover to humans, resulting in high morbidity and mortality rates. Human rabies cases are driven by frequent dog bites, inadequate access to post-exposure prophylaxis (PEP), delayed health-seeking behaviour, and deeply rooted cultural practices that favour traditional remedies over biomedical care.

Current rabies control efforts are constrained by weak surveillance systems, centralised diagnostics, limited veterinary coverage, and inconsistent vaccination campaigns. While One Health initiatives and targeted interventions have shown localised impact, they have not been implemented at the scale or intensity required to interrupt transmission nationally. Without sustained, coordinated, and adequately resourced control strategies,

Sierra Leone is unlikely to achieve the global goal of eliminating dog-mediated human rabies deaths by 2030.

Recommendations

Nationally coordinated annual mass dog vaccination campaigns targeting at least 70% coverage should be prioritised to interrupt rabies transmission. In addition, dog owners, particularly in urban areas, should be encouraged to obtain licenses and adequately sensitized regarding the good management of dogs and other pets.

Expansion of rabies diagnostic services beyond the Central Veterinary Laboratory is required to improve surveillance sensitivity and reduce delays in case confirmation.

Subsidisation and decentralised distribution of PEP are essential to reduce financial and geographic barriers, particularly in rural communities.

Culturally appropriate education campaigns should address rabies transmission, proper wound management, and the risks associated with traditional treatment practices.

Rabies control should be embedded within a functional One Health framework that promotes routine collaboration between veterinary, public health, and environmental sectors.

Standardised national dog ecology and population surveys are needed to inform vaccine procurement, campaign planning, and monitoring of intervention effectiveness.

References

Abubakar, A. T., Al-Mustapha, A. I., Oyewo, M., Ibrahim, A., Abdulrahim, I., Yakub, J. M., Elelu, N., Nguku, P., Balogun, M. S., Awosanya, E. J., Kia, G. S. N., Kwaga, J. K. P., Okoli, I., Bolajoko, M. B., Alimi, Y., Mbilo, C., and Dacheux, L. (2024). Prospects for dog rabies elimination in Nigeria by 2030. *Zoonoses* and *Public Health*, *71*(1), 1–17. https://doi.org/10.1111/zph.13084

Adedeji, A. O., Eyarefe, O. D., Okonko, I. O., Ojezele, M. O., Amusan, T. A., and Abubakar, M. J. (2010). *Why is there Still Rabies in Nigeria? - A Review of the Current* and *Future Trends in the Epidemiology, Prevention, Treatment, Control* and *Possible Elimination of Rabies*.

Broban, A., Tejiokem, M. C., Tiembré, I., Druelles, S., and L'Azou, M. (2018). Bolstering human rabies surveillance in Africa is crucial to eliminating canine-mediated rabies. *PLOS Neglected Tropical Diseases*,

12(9), e0006367. https://doi.org/10.1371/journal.pntd.0006367

Cleaveland, S., and Hampson, K. (2017). Rabies elimination research: Juxtaposing optimism, pragmatism and realism. *Proceedings of the Royal Society B: Biological Sciences*, *284*(1869), 20171880. https://doi.org/10.1098/rspb.2017.1880

Fooks, A. R., Banyard, A. C., Horton, D. L., Johnson, N., McElhinney, L. M., and Jackson, A. C. (2014). Current status of rabies and prospects for elimination. *Lancet (London, Engl*and*)*, *384*(9951), 1389–1399. https://doi.org/10.1016/S0140-6736(13)62707-5

Franka, R., and Wallace, R. (2018). Rabies diagnosis and surveillance in animals in the era of rabies elimination: -EN- Rabies diagnosis and surveillance in animals in the era of rabies elimination -FR- Le diagnostic et la surveillance de la rage chez les animaux à l'ère de l'élimination de la rage -ES- Diagnóstico y vigilancia de la rabia animal en la era de la eliminación de la enfermedad. *Revue Scientifique et Technique de l'OIE*, *37*(2), 359–370. https://doi.org/10.20506/rst.37.2.2807

Gordon, R. M., Hicks, E. P., and Davey, T. H. (1933). Two Cases of Animal Rabies Occurring in Sierra Leone. *Annals of Tropical Medicine* and *Parasitology*, *27*(1), 181–182. https://doi.org/10.1080/00034983.1933.11684750

Hampson, K., Coudeville, L., Lembo, T., Sambo, M., Kieffer, A., Attlan, M., Barrat, J., Blanton, J. D., Briggs, D. J., Cleaveland, S., Costa, P., Freuling, C. M., Hiby, E., Knopf, L., Leanes, F., Meslin, F.-X., Metlin, A., Miranda, M. E., Müller, T., … Global Alliance for Rabies Control Partners for Rabies Prevention. (2015). Estimating the global burden of endemic canine rabies. *PLoS Neglected Tropical Diseases*, *9*(4), e0003709. https://doi.org/10.1371/journal.pntd.0003709

Hatch, C., Sneddon, J., and Jalloh, G. (2004). A descriptive study of urban rabies during the civil war in Sierra Leone: 1995-2001. *Tropical Animal Health* and *Production*, *36*(4). https://doi.org/10.1023/b:trop.0000026668.54427.e9

Kaye, A. D., Perilloux, D. M., Field, E., Orvin, C. A., Zaheri, S. C., Upshaw,

W. C., Behara, R., Parker-Actlis, T. Q., Kaye, A. M., Ahmadzadeh, S., Shekoohi, S., and Varrassi, G. (2024). Rabies Vaccine for Prophylaxis and Treatment of Rabies: A Narrative Review. *Cureus*. https://doi.org/10.7759/cureus.62429

Khairullah, A., Kurniawan, S., Hasib, A., Silaen, O., Widodo, A., Effendi, M., Ramandinianto, S., Moses, I., Riwu, K., and Yanestria, S. (2023). Tracking lethal threat: In-depth review of rabies. *Open Veterinary Journal*, *13*(11), 1385. https://doi.org/10.5455/OVJ.2023.v13.i11.1

Kumoji, E. K., Oyenubi, O., Dickenson, T., Clayton, S., Helland, A., and Fofanah, J. (2018). *The Context of Rabies in Bombali District, Sierra Leone: Formative Research* and *Baseline Outcomes Monitoring Assessment Report*. MD: Johns Hopkin Center for CommunicationPrograms. https://thecompassforsbc.org/project-examples/the-context-of-rabies-in-bombali-district-sierra-leone-formative-research-and-baseline-outcomes-monitoring-assessment-report

Mshelbwala, P. P., Scott Weese, J., Sanni-Adeniy, O. A., Chakm, S., Okeme, S. S., Mamun, A. A., Rupprecht, C. E., and Magalhaes, R. J. S. (2021). Rabies epidemiology, prevention and control in Nigeria: Scoping progress towards elimination | PLOS Neglected Tropical Diseases. *PLOS Neglected Tropical Diseases*, *15*(8), 1–20. https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0009617

Mshelbwala, P. P., Wangdi, K., Bunting-Graden, J. A., Bamayange, S., Adamu, A. M., Gupta, S. D., Suluku, R., Adamu, C. S., Weese, J. S., Rupprecht, C. E., and Clark, N. J. (2024). Insights into canine rabies vaccination Disparities in Sierra Leone: A cross-sectional household study. *PLOS Neglected Tropical Diseases*, *18*(7), e0012332. https://doi.org/10.1371/journal.pntd.0012332

Mustapha, E. I., Nicol, G. P., Kamara, A., Samba, A. F., and Leigh, M. H. (2023). Dog-mediated rabies, an increasing threat to families in Kenema district: A call for action. *Sierra Leone Journal of Biomedical Research*, *14*(1), Article 1.

https://doi.org/10.4314/sljbr.v14i1.5

N'jai, A. U., Tejan-Jalloh, U.-K., Kainwo, L. M., Bunting-Graden, J., Kanu, J. S., Fahnbulleh, M., Keimbe, C., Nannoh, S. A., Alpha, A., Koroma, M. A., Bah, M. A., Koroma, O. B., Ngegba, P., Kanu, S., Suluku, R., Lichoti, J., and Nantima, N. (2024). Multisectoral One Heath Based Joint Risk Assessment of Human and Animal Rabies in Selected Districts of Sierra Leone. *Sierra Leone Journal of Biomedical Research*, *15*(1), Article 1. https://sljbr.org/index.php/sjbmr/article/view/183

Rattanavipapong, W., Thavorncharoensap, M., Youngkong, S., Genuino, A. J., Anothaisintawee, T., Chaikledkaew, U., and Meeyai, A. (2019). The impact of transmission dynamics of rabies control: Systematic review. *Vaccine*, *37*, A154–A165. https://doi.org/10.1016/j.vaccine.2018.11.035

Roland, S., Benjamin, E., Patrick, B. V., Juana, M., and Derrick, A. (2022). Seroprevalence and predisposing factors of rabies antibodies in unvaccinated dogs in Sierra Leone. *Veterinary Medicine* and *Science*, *8*(6), 2345–2350. https://doi.org/10.1002/vms3.946

Sabeta, C., and Ngoepe, E. C. (2018). Controlling dog rabies in Africa: Successes, failures and prospects for the future: -EN- Controlling dog rabies in Africa: successes, failures and prospects for the future -FR- La lutte contre la rage canine en Afrique : réussites, échecs et perspectives d'avenir -ES- Éxitos, fallos y perspectivas de futuro de la lucha contra la rabia canina en África. *Revue Scientifique et Technique de l'OIE*, *37*(2), 439–449. https://doi.org/10.20506/rst.37.2.2813

Suluku, R. (2023). Analysis of Dog Ownership Pattern and the Spread of Rabies Disease in Sierra Leone. *International Journal of Zoology* and *Animal Biology*, *6*(6), 1–10. https://doi.org/10.23880/izab-16000536

Suluku, R., Abu-Bakarr, M. I., Johnny, M. J., and Jonsyn-Ellis, P. F. (2012). Post-war Demographic and Ecological Survey of Dog Populations and Their Human Relationships in Sierra Leone. (A Case Study of Urban Freetown). *Science Journal of Agricultural*

Research and *Management*, *2012*. http://www.sjpub.org/sjar/abstract/sjarm-282.html

Suluku, R., Benjamin Obukowho, E., Macavoray, A., and Nelphson Kallon, M. (2022). Rabies Virus in Sierra Leone: Challenges and Recommended Solutions for Elimination by 2030. In S. Tkachev (Ed.), *Veterinary Medicine* and *Science* (Vol. 9). IntechOpen. https://doi.org/10.5772/intechopen.99691

Suluku, R., Jalloh, A. T., and Emikpe, B. O. (2018). Implementing One Health Concept in Rural Communities: Approaches and Challenges in Sierra Leone. *African Journal of Biomedical Research*, *21*(3), Article 3. https://www.ajol.info/index.php/ajbr/article/view/181577

Suluku, R., Nyandeboh, J., Kallon, M., Barrie, A., Kabba, B., Koroma, B., and Emikpe, B. (2017). First reported case of dog associated cattle rabies in Koinadugu district, Northern Sierra Leone. *African Journal of Biomedical Research*, *20*(3), 325–327.

Tiwari, H. K., Robertson, I. D., O'Dea, M., and Vanak, A. T. (2019). Knowledge, attitudes and practices (KAP) towards rabies and free roaming dogs (FRD) in Panchkula district of north India: A cross-sectional study of urban residents. *PLOS Neglected Tropical Diseases*, *13*(4), e0007384. https://doi.org/10.1371/journal.pntd.0007384

Whitbread, T. A., Kabuya, K. J., Naran, N., Juggernath, A. M., Matthews, M. A., Blumberg, L. H., Weyer, J., and Essel, V. (2022). A retrospective review of rabies post-exposure prophylaxis queries, South Africa, 2016–2019. *Southern African Journal of Infectious Diseases*, *37*(1). https://doi.org/10.4102/sajid.v37i1.354

Williams, S. M. T., Ansumana, R., Johnny, J., Bakarr, I. A., and Osborne, A. (2023). Knowledge, Attitudes and Practices Assessment on Bat-Borne Zoonotic Diseases Among the People of Moyamba District, Sierra Leone. *Risk Management* and *Healthcare Policy*, *Volume 16*, 1331–1342. https://doi.org/10.2147/RMHP.S413802